



(12) **United States Patent**
Jimmy et al.

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- (54) **METHOD OF MANUFACTURING SEMICONDUCTOR ELEMENT**
- (75) Inventors: **Chew Hwee-Seng Jimmy**, Singapore (SG); **Ong Chee Kian**, Singapore (SG); **Abd. Razak Bin Chichik**, Singapore (SG)
- (73) Assignee: **ADVANPACK SOLUTIONS PTE LTD.**, Singapore (SG)
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See application file for complete search history.

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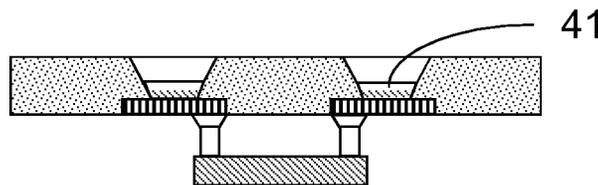
Primary Examiner — Ermias Woldegeorgis

(74) *Attorney, Agent, or Firm* — Rabin & Berdo, P.C.

(57) **ABSTRACT**

A method of manufacturing a semiconductor element is provided. The method includes the following steps. A carrier and a mold are provided. A first patterned conductive layer including a plurality of traces is formed on the carrier. A second patterned conductive layer is formed on the first patterned conductive layer. The carrier is disposed with the mold to form at least one mold cavity. The mold cavity is infused with a molding material. The molding material fills the mold cavity to encapsulate the first and second patterned conductive layers. The carrier is removed by etching to expose the plurality of traces embedded in the molding material without affecting the width of the traces.

29 Claims, 11 Drawing Sheets



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FIG. 1

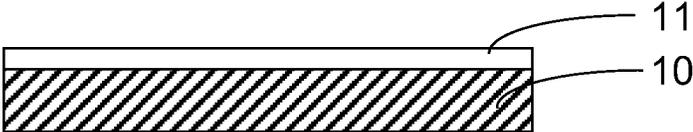


FIG. 2

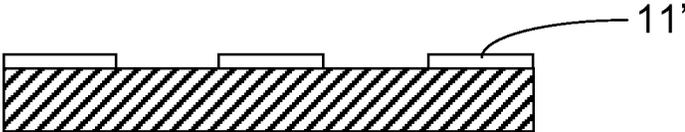


FIG. 3

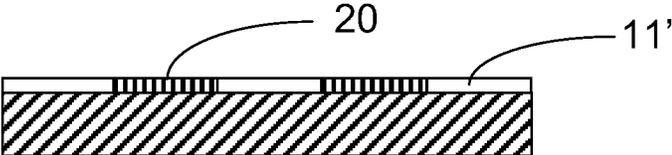


FIG. 4

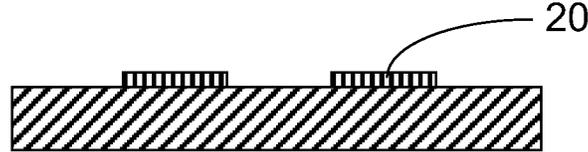


FIG. 5

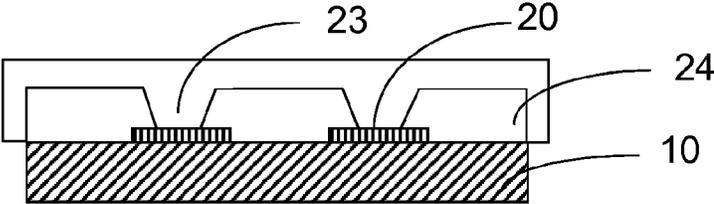


FIG. 6

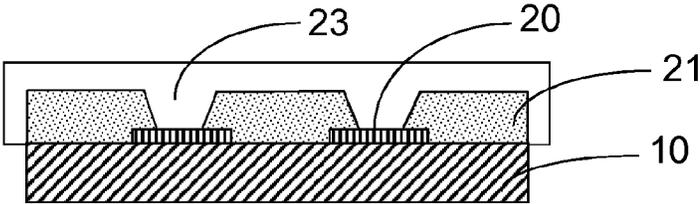


FIG. 7

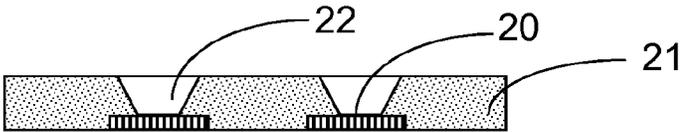


FIG. 8

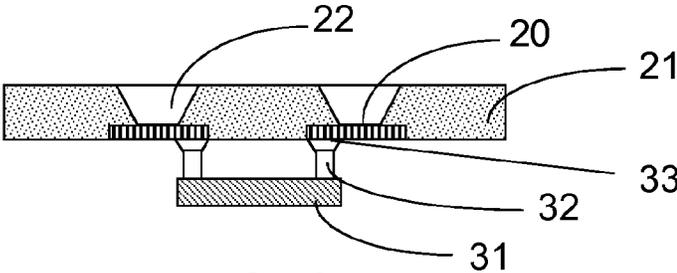


FIG. 9

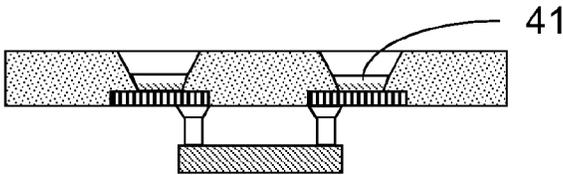
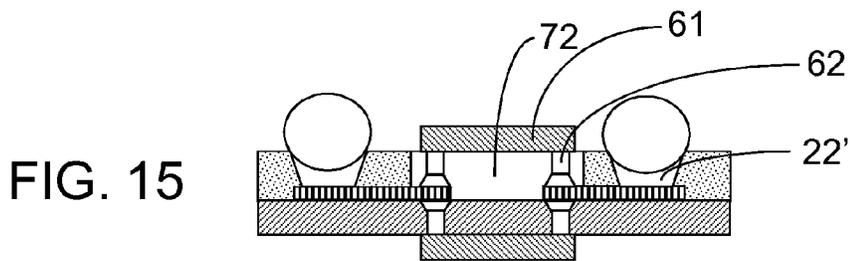
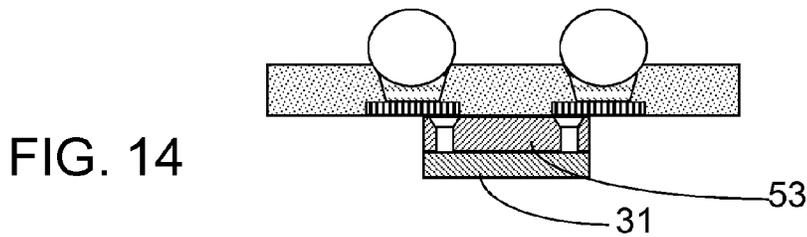
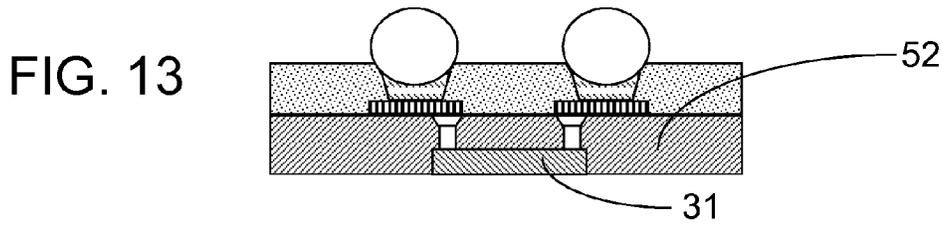
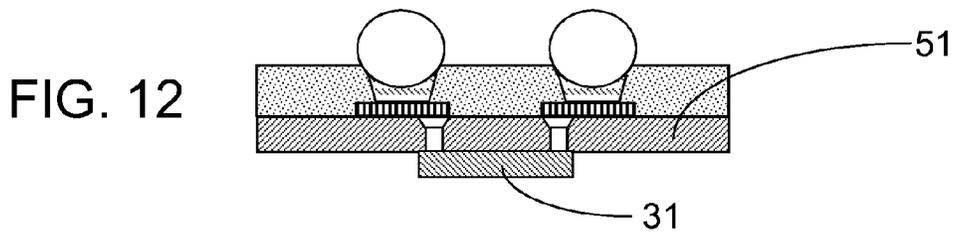
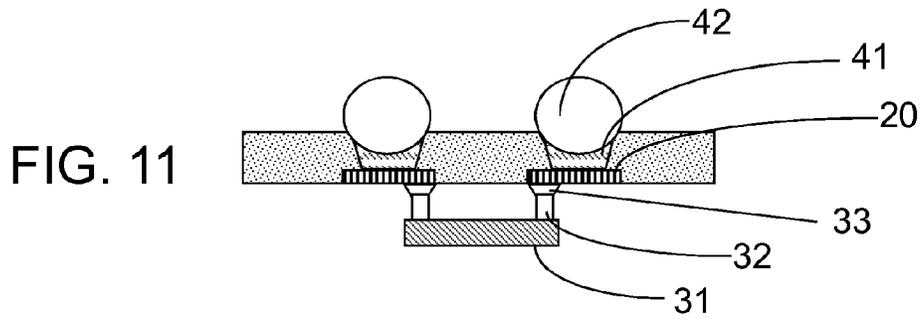


FIG. 10



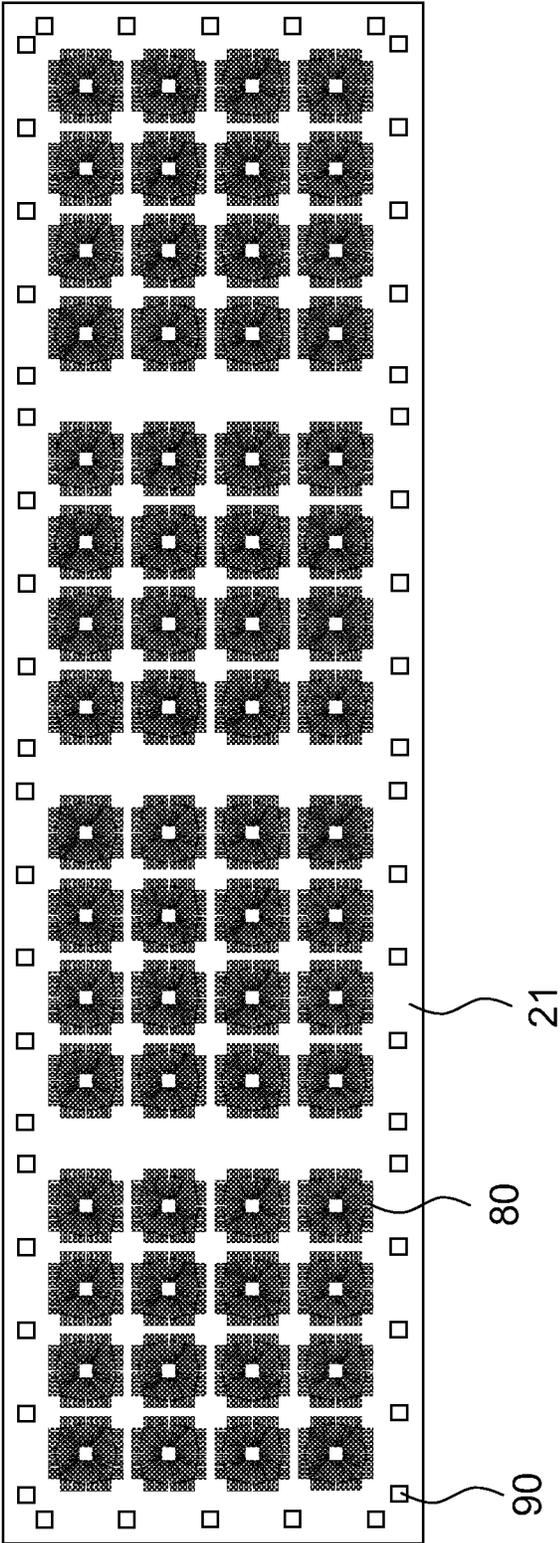


FIG. 16

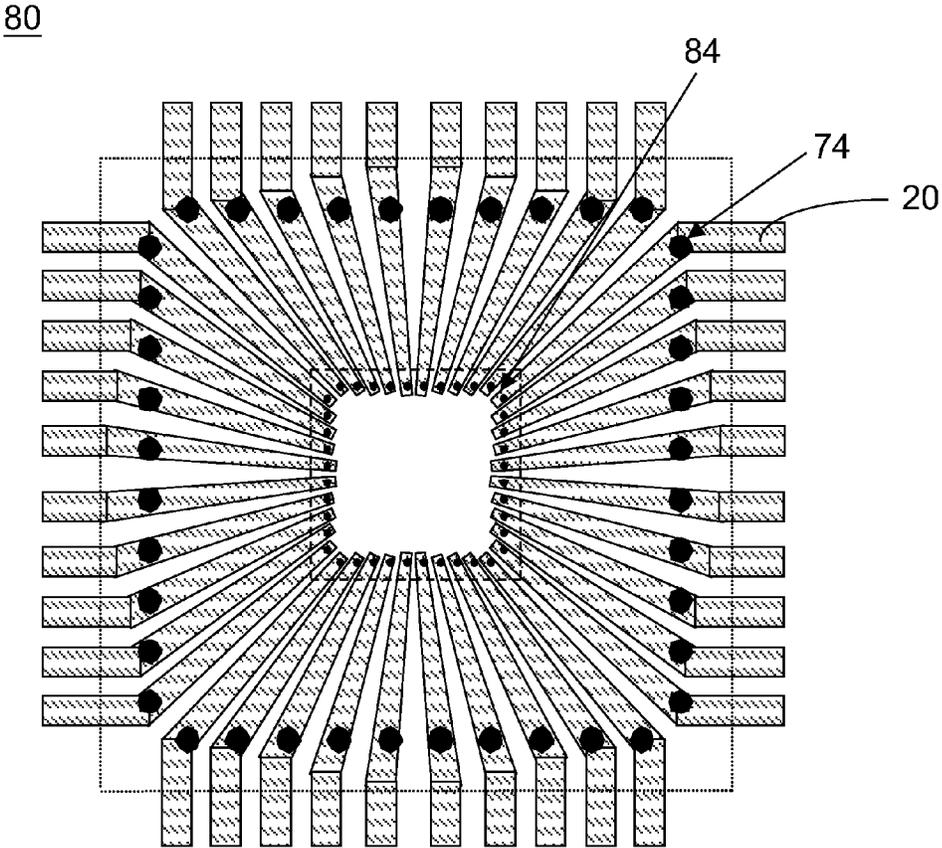
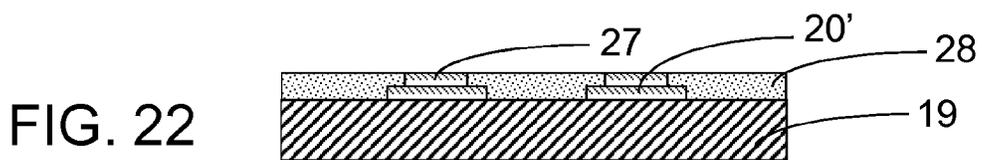
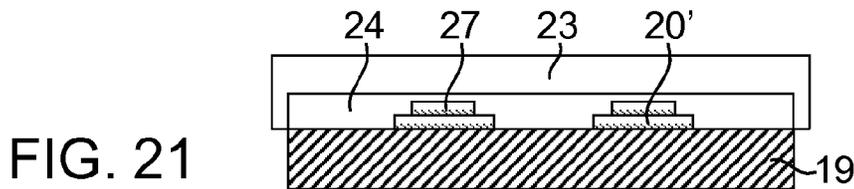
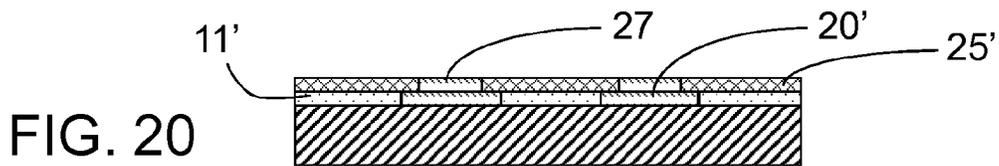
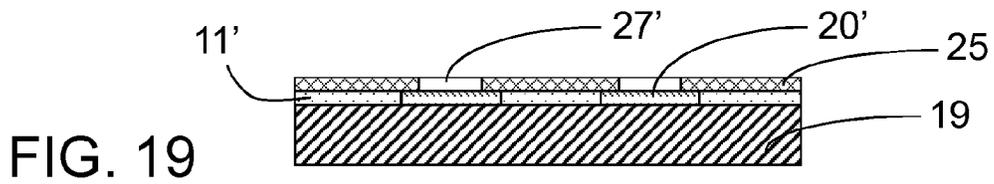
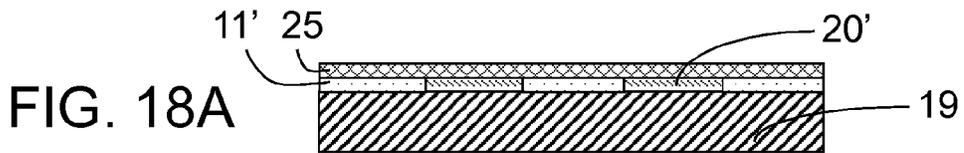
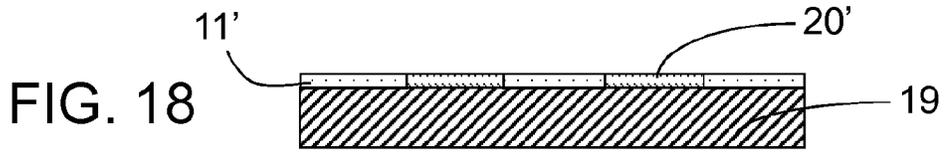


FIG. 17



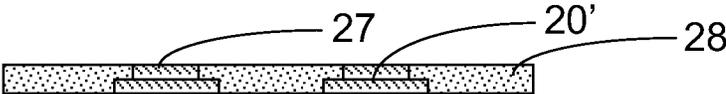


FIG. 23

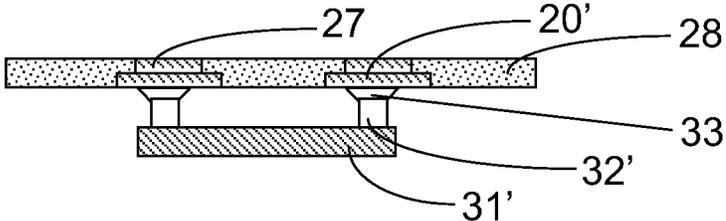


FIG. 24

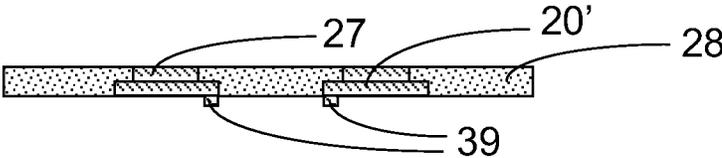


FIG. 25

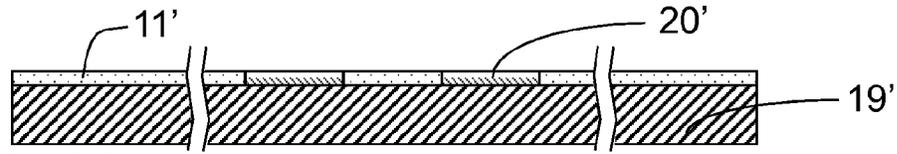


FIG. 26

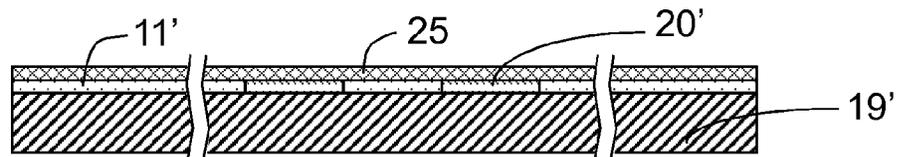


FIG. 26A

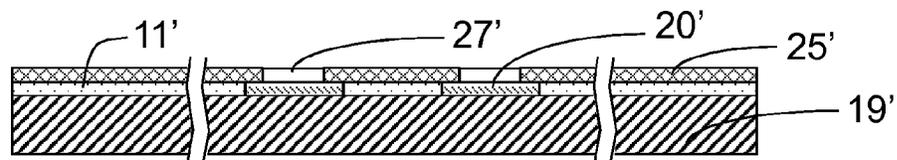


FIG. 27

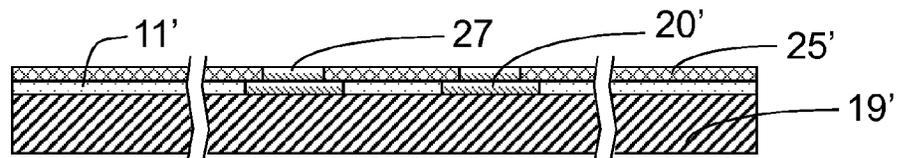


FIG. 28

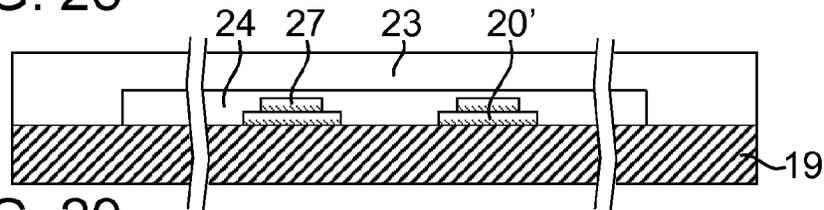


FIG. 29

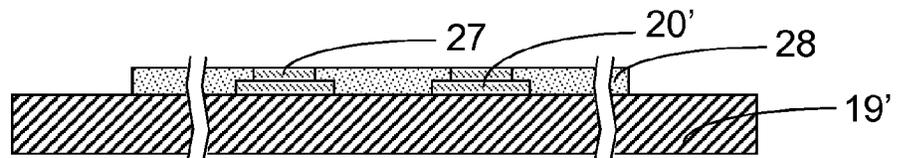


FIG. 30

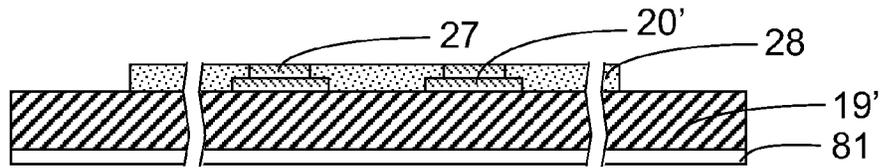


FIG. 31

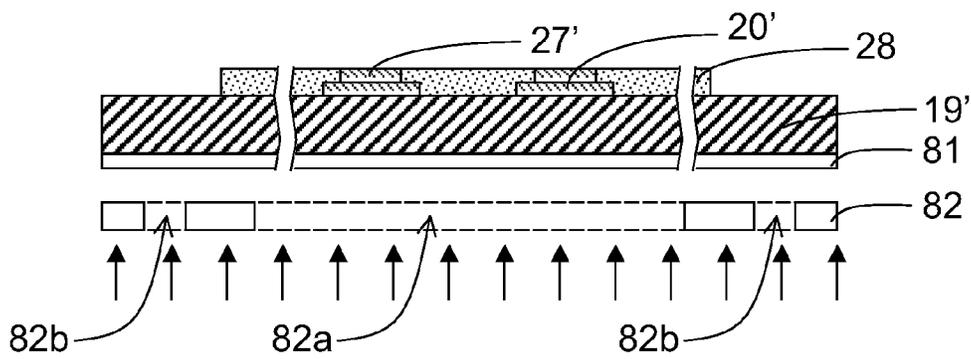


FIG. 32

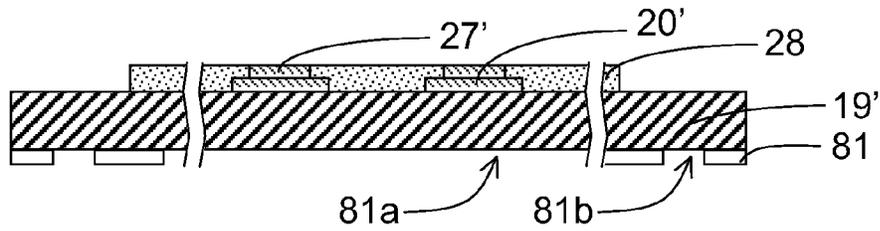


FIG. 33

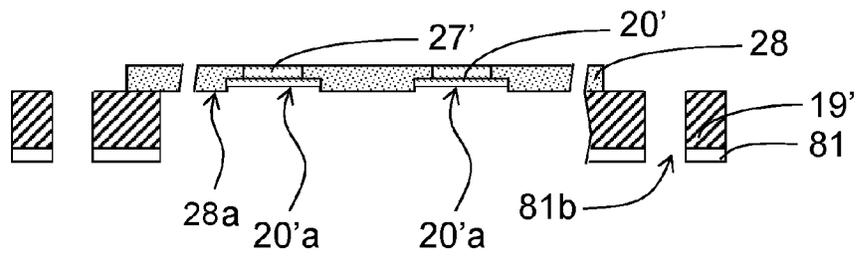


FIG. 34

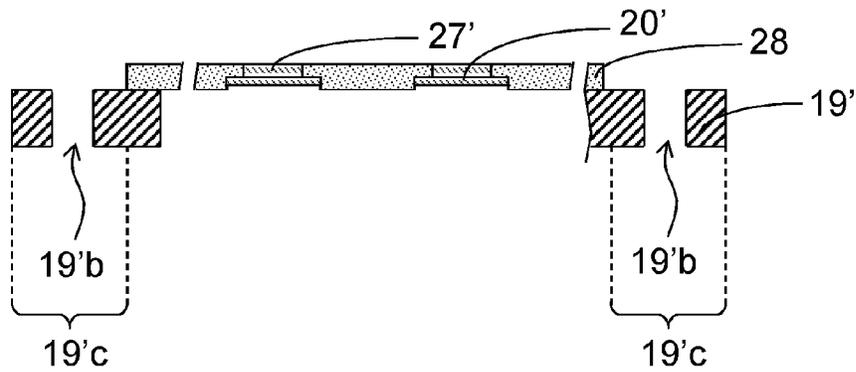


FIG. 35

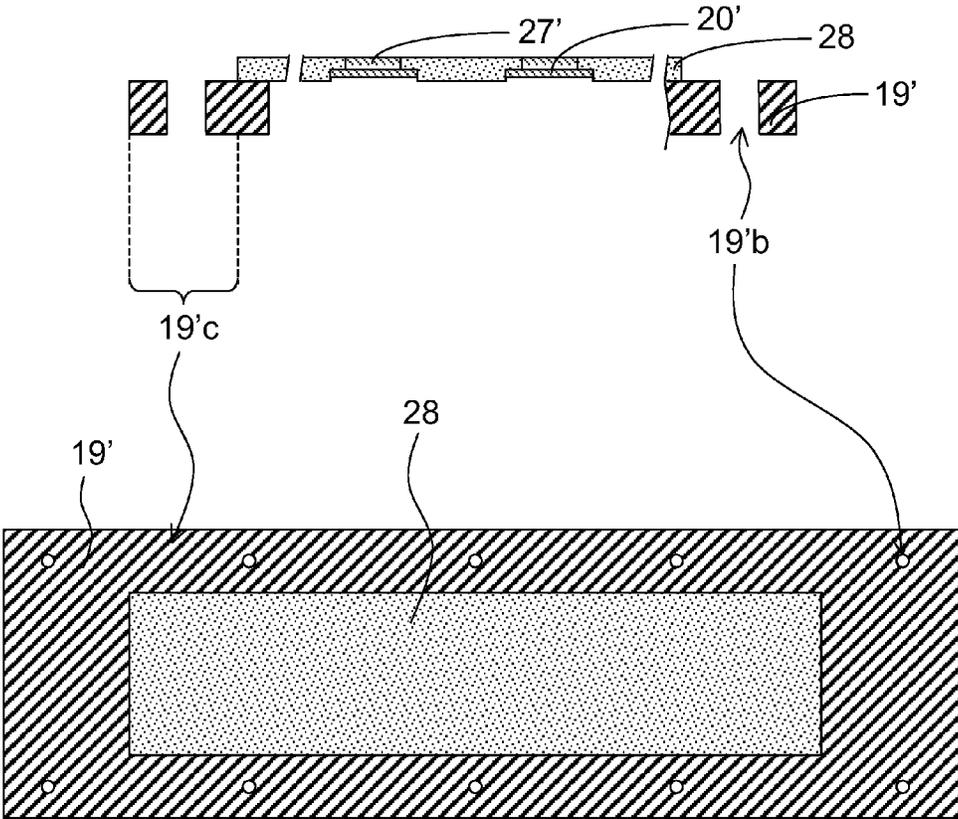


FIG. 36

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METHOD OF MANUFACTURING SEMICONDUCTOR ELEMENT

RELATED APPLICATIONS

This application is a divisional application of U.S. application Ser. No. 12/292,813, filed Nov. 26, 2008, which was a Continuation of U.S. application Ser. No. 11/898,717, filed Sep. 14, 2007, that was a Continuation-in-part of U.S. application Ser. No. 11/882,194, filed Jul. 31, 2007 the subject matters of which are incorporated herein by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates in general to a semiconductor package and manufacturing method thereof, and more particularly to a semiconductor package whose lead frame can be independently isolated and transported during the manufacturing process.

2. Description of the Related Art

Along with the advance in science and technology, the demand for various electronic products is booming. Meanwhile, as miniaturization is expected of electronic products by consumers, the semiconductor element, a crucial element used in an electronic product, is also directed towards the design of miniaturization, and the reduction in the pitch and width of the circuit of a semiconductor element has always been an important direction in the semiconductor industry. However, in addition to the reduction in the pitch and width of the circuit inside a semiconductor chip, the chip package carrying the signal and extended to the external also plays an important part in the miniaturization of a semiconductor element. If the circuit and pitch of a semiconductor package can not be effectively reduced, the miniaturization in the size of a semiconductor element using the same will be very limited.

For example, the thickness of a metallic trace of a conventional package normally ranges between 120~250 micrometer, and a package trace is formed after the process of microfilming, exposure and etching. However, the etching process restricts the pitch and width of a circuit, and the undercutting effect will affect the reliability of the package trace. Therefore, the conventional lead frame of the package trace is not suitable to the miniaturization in semiconductor element.

Thus, how to resolve the above problem of element miniaturization and simplify the manufacturing process of the package has become an important direction in the research and development of semiconductor package.

SUMMARY OF THE INVENTION

According to a first aspect of an embodiment of the present invention, a semiconductor package is provided. The semiconductor package comprises a first insulating layer and a plurality of package traces, wherein a plurality of holes are disposed on a first surface of the first insulating layer, and the package traces are embedded in the insulating layer and connected to another end of the holes.

According to an aspect of another embodiment of the present invention, a semiconductor package is provided. The semiconductor package comprises a first insulating layer, a plurality of positioning units and a plurality of package traces. The elastic modulus of the first insulating layer is larger than 1.0 GPa. The positioning units are disposed on the first insulating layer. The package traces are disposed under the positioning unit.

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According to an aspect of another embodiment of the present invention, a manufacturing method of a semiconductor package is provided. The manufacturing method comprises the following steps. Firstly, a carrier is provided. Next, a plurality of traces are formed on the carrier. Then, a first insulating layer is formed on the traces. Afterwards, a plurality of positioning units are formed on a first surface of the first insulating layer next, wherein the positioning unit contacts the trace directly.

According to an aspect of another embodiment of the present invention, a method of manufacturing a semiconductor package is provided. The method of manufacturing the semiconductor package comprises the following steps. Firstly, a carrier is provided. Then, a plurality of electrically isolated package trace layout units are formed by a first conductive layer, wherein the package trace layout unit is formed by a plurality of electrically isolated package traces. Afterwards, a patterned second conductive layer is formed on the first conductive layer. Then a first insulating layer is formed by a molding material and embedded in the first conductive layer and the second conductive layer. After that, part of the carrier is selectively removed.

The invention will become apparent from the following detailed description of the preferred but non-limiting embodiments. The following description is made with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 to FIG. 8 are process flowcharts of manufacturing an independent semiconductor package according to a first embodiment of the invention;

FIG. 9 to FIG. 14 are detailed flowcharts of manufacturing and connecting an independent semiconductor package to a chip exemplified by three different chip packages according to a first embodiment of the invention, and

FIG. 15 is an example of the first embodiment of the invention used in a multi-chip package.

FIG. 16 to FIG. 17 are detailed diagrams before the package elements of the first embodiment of the invention are packaged; and

FIG. 18 to FIG. 25 are diagrams of manufacturing an independent semiconductor package according to a second embodiment of the invention.

FIG. 26 to FIG. 36 are diagrams of manufacturing an independent semiconductor package according to a third embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

First Embodiment

Referring to FIG. 1 onwards, process flowcharts of manufacturing an independent semiconductor package according to a first embodiment of the invention are shown. Firstly, a carrier 10 is provided. In the present embodiment of the invention, the carrier 10 is a steel piece. Then, referring to FIG. 2, a photo-resist layer 11 is formed on the carrier 10 first, and further shaped as a patterned photo-resist layer 11' as indicated in FIG. 3.

Referring to FIG. 4, a conductive layer 20 is formed in the empty part of the photo-resist layer 11', wherein the thickness of the conductive layer 20 normally between ranges 0.01~0.4 mm, but preferably ranges between 0.025~0.035 mm. In the present embodiment of the invention, the conductive layer 20 is formed by electroplating. As indicated in FIG. 5, the photo-resist layer 11' is removed, but the conductive layer 20 (the first conductive layer) is left and used as package traces not

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the traces inside a semiconductor chip. In the present embodiment of the invention, a plurality of package traces formed by the conductive layer 20 are preferably electrically isolated and used as a package trace layout unit. In practical application, the package traces are electrically connected to each other. During the process of formation, a plurality of package trace layout units are formed, and each package trace layout unit substantially has the same pattern and individually corresponds to a to-be-packaged chip.

Referring to FIG. 6, a mold 23 is provided, wherein the mold 23 has a plurality of protrusions corresponding to the position of the trace layer 20. At least one mold cavity 24 is formed with the mold 23. Then, an insulating material is infused in the mold cavity 24 to form a first insulating layer 21, wherein the thickness of the first insulating layer 21 normally ranges between 0.1~0.4 mm, but preferably ranges between 0.18~0.22 mm. As indicated in FIG. 7, a plurality of package traces are embedded in the first insulating layer 21 or disposed in the first insulating layer 21 and extended to a surface of the first insulating layer 21. In the present embodiment of the invention, the insulating material is a molding material, the elastic modulus of the insulating material is larger than 1.0 GPa, and preferably the CTE value of the insulating material is less than 10 ppm. In practical application, the first insulating layer 21 is not necessarily limited to one layer. Any one who is skilled in the technology of the invention can use several materials to compose a compound insulating layer in several times of formation or use the same material to compose an insulating layer in several times of formation, and such modifications are still within the scope of protection of the invention. However, in the present embodiment of the invention, the first insulating layer 21 is formed from a single material, such that the package traces are embedded in the first insulating layer 21. That is, the height of the first insulating layer 21 must be larger than the height of the package traces.

As a plurality of protrusions disposed on the mold 23 correspond to the trace layer 20, a plurality of holes 22 are formed on a surface of the first insulating layer 21. Referring to FIG. 8, the mold 23 and the carrier 10 are removed, and a semiconductor package that can be transported independently is formed. In the present embodiment of the invention, the other end of the holes 22 contacts the package trace of the trace layer 20, wherein the holes used as positioning units for connecting the conductors are made from the trace layer 20

Referring to FIG. 9, an independent semiconductor package manufactured according to FIG. 8 is connected to a chip 31 via a second conductor. In the present embodiment of the invention, the second conductor is connected to the chip 31 via a solder 33 and a pillar bump 32. Besides, as indicated in FIG. 10, the hole 22 can be fully or partly filled with a conductive material, such as nickel, gold, copper or solder, to form a second conductive layer 41. In the present embodiment of the invention, the conductive material is formed by solder 41 to facilitate subsequent processing.

Referring to FIG. 11, the conductor 42 is fixed on the independent semiconductor package via position-setting of the holes 22, such that the signal of the chip 31 is transmitted externally via pillar bump 32, the solder 33, the trace layer 20, and the conductor 42. In the present embodiment of the invention, the conductor 42 is a solder ball or a trace and the conductor 42 could be used to connect to printed circuit board (PC Board) or another layer of receiving substrate. To avoid the solder of the solder ball flowing everywhere when melted, the positioning unit limits is for confining the solder to be within the hole 22. In the present embodiment of the

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invention, the positioning unit is a hole 22, which can be a run through hole or an indent only.

The solder 41 enables the electrical connection between the conductor 42 and the trace layer 20 even more tightly, and avoids the occurrence of bubbles which occurs when a solder ball is used as the conductor 42 but can not completely fill up the hole 22.

On the other hand, the independent semiconductor package and the package of the chip 31 can be flexible. Referring to FIG. 12, an insulating material, such as an encapsulating material, can be used as a second insulating layer 51 and infused to the chip 31 to encapsulate the pillar bump 32 but exposes the chip 31. Or, as indicated in FIG. 13, the second insulating layer 52 encapsulates the pillar bump 32 and the chip 31 but exposes the upper surface of the chip 31. Or, as indicated in FIG. 14, the second insulating layer 53 encapsulates the pillar bump 32 but is aligned with the chip 31.

Besides, the semiconductor package is also used in a multi-chip package. Referring to FIG. 15, a space 72 permitting the chip 61 to be fixed and connected to the trace is disposed in addition to the hole of the first insulating layer, and the chip is connected to the solder ball via a hole 22'.

Referring to FIG. 16, a perspective of a lead frame according to a first embodiment of the invention is shown. FIG. 16 is bottom view of FIG. 8, wherein the package trace layout unit 80 formed by a first conductive layer is embedded in the first insulating layer 21, and a plurality of fiducial marks 90 are used for positioning a lead frame when the chip is packaged. In the present embodiment of the invention, the shape of individual package trace layout unit 80 is indicated in FIG. 17. A package trace layout unit 80 comprises a plurality of electrically isolated package traces to form the pattern of a package trace layout unit and correspond to a to-be-packaged chip, wherein smaller chips are electrically connected via the conductive dots 84, and larger chips are electrically connected via the conductive dots 74. Thus, it can be used as the lead frame of different sized chips in the present embodiment of the invention. As indicated in FIG. 16 and FIG. 17, the package trace layout units 80 substantially have the same pattern, and the package trace layout units 80, isolated between each other, are arranged in a matrix and embedded in the first insulating layer 21.

Each package trace layout unit 80 preferably has a fan-in or fan-out pattern. The first conductive layer 20 and the second conductive layer 41 can have different pitches to achieve the function of fine pitch.

Second Embodiment

Referring to FIG. 18 and onwards, a method of manufacturing a semiconductor package according to a second embodiment of the invention is shown. Firstly, a carrier 19 is provided, wherein the carrier 19 is made from copper in the present embodiment of the invention. Like FIG. 1 to FIG. 4 of the first embodiment, other manufacturing methods obtain the stage result as indicated in FIG. 18, a patterned first conductive layer 20' is formed in the first patterned photo-resist layer 11' on the carrier 19'.

Referring to FIG. 19, a second photo-resist layer 25 is coated on the first patterned photo-resist layer 11', and a hole 27' is formed on the second photo-resist layer 25 to form a second patterned photo-resist layer 25'. Referring to FIG. 20, a second conductive layer 27 is formed in the hole 27'. In the present embodiment of the invention, the second conductive layer 27 is formed by way of electroplating and is substantially flat and not protruding from the surface of the first insulating layer 28.

The photo-resist layer 25 is removed such that a patterned first conductive layer 20' and a second conductive layer 27 are

obtained. As indicated in FIG. 21, a mold 23 is provided and at least one mold cavity 24 is formed with the mold 23. Referring to FIG. 22, a molding material is injected to form a first insulating layer 28, such that the patterned first conductive layer 20' and the second conductive layer 27 are embedded in the first insulating layer 28. In the present embodiment of the invention, the molding material used to form the first insulating layer 28 is epoxy resin, the elastic modulus of the molding material is greater than 1.0 GPa, but the CTE value of the elastic modulus is less than 10 ppm.

By way of etching, the carrier 19 is removed to obtain a semiconductor package before package as indicated in FIG. 23. The application of the unpackaged semiconductor package is indicated in FIG. 24, and the unpackaged semiconductor package can be connected to the chip 31' via the solder 33', the pillar bump 32'.

Besides, the second conductive layer 27 can be pre-treated to resolve the resin residue problem arising in a QFN package when the tape is removed.

Referring to FIG. 25, a conductive protrusion 39 can be disposed on the first conductive layer 20' of the package trace layout. The conductive protrusion 39 can be made from silver, gold, other metals or conductive materials, and the part of the package trace layout directly atop of the conductive protrusion is the molding material of the first insulating layer 28. Thus, when the unpackaged semiconductor package is used in conventional wiring bonding, the trace can be connected to the conductive protrusion 39 such that the lead frame neighbors the chip package as close as possible and will not wobble when connected to the traces, hence increasing the efficiency of bonding the wire to the chip.

Third Embodiment

Referring to FIG. 26 and onwards, a method of manufacturing a semiconductor package according to a third embodiment of the invention is shown. Firstly, a carrier 19' is provided, wherein the carrier 19' is made from copper in the present embodiment of the invention. Like FIG. 1 to FIG. 4 of the first embodiment, other manufacturing methods obtain the stage result as indicated in FIG. 26, a patterned first conductive layer 20' is formed in the first patterned photo-resist layer 11' on the carrier 19'.

Referring to FIG. 27, a second photo-resist layer 25 is coated on the first patterned photo-resist layer 11', and a hole 27' is formed on the Patterned photo-resist layer 25. Referring to FIG. 28, a second conductive layer 27 is formed in the hole 27'. In the present embodiment of the invention, the second conductive layer 27 is formed by way of electroplating and is substantially flat and not protruding from the surface of the first insulating layer 28.

The photo-resist layer 25 is removed such that a patterned first conductive layer 20' and a second conductive layer 27 are obtained. As indicated in FIG. 29, a mold 23 is provided and at least one mold cavity 24 is formed with the mold 23. Referring to FIG. 30, a molding material is injected to form a first insulating layer 28, such that the patterned first conductive layer 20' and the second conductive layer 27 are embedded in the first insulating layer 28. In the present embodiment of the invention, the molding material used to form the first insulating layer 28 is epoxy resin, the elastic modulus of the molding material is greater than 1.0 GPa, but the CTE value of the elastic modulus is less than 10 ppm.

By way of etching, part of the carrier 19' is selectively removed to obtain a semiconductor package before package as indicated in FIGS. 31-35.

Referring to FIG. 31, a photo resist layer 81 is formed on the carrier 19'. Then the photo resist layer 81 is exposed via a mask 82 having at least a first opening 82a and at least a

second opening 82b as shown in FIG. 32. And a patterned photo resist layer 81 having at least a first opening 81a and at least a second opening 81b is obtained as indicated in FIG. 33. Wherein the first opening 81a and the first opening 82a are corresponding with the inside area of the first insulating layer 28, and the second opening 81b and the second opening 82b are corresponding with the outside area of the first insulating layer 28.

Afterwards, referring to FIG. 34, the carrier 19' is etched by taking the patterned photo resist layer 81 as a mask. Wherein the carrier 19' and part of the first conductive layer 20' are etched simultaneously so that the surface 20'a of the first conductive layer 20' and the surface 28a of the first insulating layer 28 are not located at the same plane. Then, the patterned photo resist layer 81 is removed so that an enforcement ring 19'c and at least a positioning hole 19'b are formed on the carrier 19' as indicated in FIG. 35.

Please refer to FIG. 36. After part of the carrier 19' is selectively removed, the enforcement ring 19'c is formed on the peripheral area of the carrier 19' and the positioning hole 19'b are formed in the enforcement ring 19'c. The semiconductor package can be carried via the enforcement ring 19'c and the position hole 19'b without touching the first insulating layer 28 or the second conductive layer 27. Therefore, the scraping damage of the semiconductor package can be prevented.

The conductive layer 20 or 20' (the package trace) is formed during the manufacturing process without applying extra process such as micro-filming, exposure and etching on the conductive layer, so that the conductive layer is not restricted by the etching pitch and the reliability of the package trace will not be affected by undercutting. However, the package trace meets the requirement of miniaturization in the semiconductor element better.

The package trace layout unit has a fan-in or fan-out pattern to achieve the function of fine pitch.

Moreover, the hole 22 (the positioning unit) makes the positioning setting of connecting the solder ball to the package element more precisely, and avoids the overflowing of the solder when melted.

Besides, the mold 23, and hole 22 (the positioning unit) are formed by using the material of the first insulating layer 21 directly, such that the first insulating layer 21 and the positioning unit are formed by one filling of the molding material, largely simplifying the manufacturing process of the semiconductor package.

Moreover, according to FIG. 11, with the disposition of the package trace 20, the pitch between the solder balls can be larger than the pitch between the chip bumps 32. Therefore, the technology of the invention can be applied to a manufacturing process with a lower requirement of the pitch.

Furthermore, the first insulating layer 21 uses a molding material as a carrier for the package trace pattern, therefore the package trace patterns are not connected by metallic traces and are different from conventional lead frame which has traces for connecting the package trace patterns. The insulating layer between the traces of the lead frame is simply used for insulating purpose and can not be used as a carrier. As a result, in the embodiments of the invention does not have the connecting traces for connecting the lead frame patterns, and each package has an individual pattern, and is easier for cutting.

In a conventional chip, the package traces are connected via metallic traces, therefore the package traces must be divided first before the chip can be tested individually. In the above embodiments, as each package trace pattern is electrically isolated and does not have metallic traces for connect-

tion, the chip still can be tested even after the chip is connected to the package trace, largely saving time and cost for testing.

While the invention has been described by way of example and in terms of a preferred embodiment, it is to be understood that the invention is not limited thereto. On the contrary, it is intended to cover various modifications and similar arrangements and procedures, and the scope of the appended claims therefore should be accorded the broadest interpretation so as to encompass all such modifications and similar arrangements and procedures. For example, the first insulating layer 21, is not necessarily limited to one layer. Any one who is skilled in the technology of the invention can use several materials to compose a compound insulating layer in several times of formation or use the same material to compose an insulating layer in several times of formation, and such modifications are still within the scope of protection of the invention which is defined in the appended claims.

What is claimed is:

1. A method of manufacturing a semiconductor element, comprising the steps of:

providing a carrier and a mold;
forming a first patterned conductive layer comprising a plurality of traces, on the carrier;
forming a second patterned conductive layer on the first patterned conductive layer;
disposing the carrier with the mold to form at least one mold cavity;
infusing the mold cavity with a molding material, wherein the molding material fills the mold cavity to encapsulate the first and second patterned conductive layers; and
removing the carrier by etching to expose the plurality of traces embedded in the molding material without affecting the width of the traces.

2. The manufacturing method according to claim 1, wherein the steps of forming the first and second patterned conductive layers comprise:

forming a first photo-resist layer on the carrier;
patterning the first photo-resist layer to form at least one first opening exposing the carrier;
electroplating the first conductive layer in the first opening of the first photo-resist layer;
forming a second photo-resist layer on the first photo-resist layer;
patterning the second photo-resist layer to form at least one second opening exposing the first conductive layer;
electroplating the second conductive layer in the second opening of the second photo-resist layer; and
removing the first and second photo-resist layers to form the first and second patterned conductive layers.

3. A method of manufacturing a semiconductor element, comprising the steps of:

providing a carrier and a mold;
forming a first conductive layer comprising a plurality of traces, on the carrier;
disposing the carrier with the mold to form at least one mold cavity;
infusing the mold cavity with a molding material, wherein the molding material fills the mold cavity to encapsulate the first conductive layer;
forming a plurality of holes in the molding material opposite the carrier to expose the plurality of traces;
filling the plurality of holes with a conductive material to form a second conductive layer connected to the first conductive layer; and

removing the carrier by etching to expose the plurality of traces embedded in the molding material without affecting the width of the traces.

4. The manufacturing method according to claim 1 or 3, further comprising:

forming an insulating layer with the molding material.

5. The manufacturing method according to claim 4, wherein

the plurality of traces forms a plurality of package trace layout units arranged in a matrix.

6. The manufacturing method according to claim 5, further comprising:

disposing a plurality of semiconductor chips on the insulating layer, wherein each semiconductor chip corresponds and connects to a package trace layout unit; and
forming a chip insulating layer to encapsulate the plurality of semiconductor chips.

7. The manufacturing method according to claim 1 or 3, wherein the step of removing the carrier comprises:

selectively removing part of the carrier.

8. The manufacturing method according to claim 7, wherein the step of selectively removing part of the carrier comprises:

forming a photo-resist layer on the carrier;
patterning the photo-resist layer to form at least one opening exposing the carrier;
etching away the carrier exposed in the opening of the photo-resist layer; and
removing the photo-resist layer.

9. The manufacturing method according to claim 1 or 3, wherein the step of removing the carrier further comprises:
etching the carrier and the plurality of traces so that the surface of the traces and the surface of the molding material are not located in a same plane.

10. The manufacturing method according to claim 1 or 3, wherein the carrier is completely removed.

11. The manufacturing method according to claim 1 or 3, further comprising:

forming a plurality of second traces on the molding material opposite the carrier, wherein the plurality of second traces is connected to the second conductive layer.

12. A method of manufacturing a semiconductor element, comprising the steps of:

providing a carrier and a mold;
forming a first conductive layer comprising a plurality of traces, on the carrier;
disposing the carrier with the mold to form at least one mold cavity;
infusing the mold cavity with a molding material, wherein the molding material fills the mold cavity to encapsulate the first conductive layer;
forming an insulating layer with the molding material, wherein the area of the insulating layer is smaller than the area of the carrier; and
selectively removing part of the carrier to expose the plurality of traces embedded in the molding material and to form an enforcement ring on a peripheral area of the insulating layer, wherein part of the enforcement ring corresponds with an outside area of the insulating layer.

13. The manufacturing method according to claim 12, further comprising:

forming a second conductive layer on the first conductive layer.

14. The manufacturing method according to claim 13, wherein the step of forming the second conductive layer comprises:

forming a photo-resist layer on the first conductive layer; patterning the photo-resist layer to form at least one opening exposing the first conductive layer; electroplating a conductive material in the opening of the photo-resist layer; and removing the photo-resist layer.

15. The manufacturing method according to claim **13**, wherein the step of forming the second conductive layer comprises:

forming a plurality of holes in the molding material opposite the carrier to expose the first conductive layer; and filling the plurality of holes with a conductive material to connect with the first conductive layer.

16. The manufacturing method according to claim **14** or **15**, further comprising:

forming a plurality of second traces on the molding material opposite the carrier, wherein the plurality of second traces are connected to the second conductive layer.

17. The manufacturing method according to claim **14** or **15**, wherein the conductive material is copper.

18. The manufacturing method according to claim **12**, wherein the step of selectively removing part of the carrier comprises:

forming a photo-resist layer on the carrier; patterning the photo-resist layer to form at least one opening exposing the carrier; etching away the carrier exposed in the opening of the photo-resist layer; and removing the photo-resist layer.

19. The manufacturing method according to claim **18**, wherein the step of patterning the photo-resist layer comprises:

forming at least a first opening and at least a second opening, wherein the first opening corresponds with the inside area of the insulating layer and the second opening corresponds with the outside area of the insulating layer.

20. The manufacturing method according to claim **18**, wherein the step of etching away the carrier further comprises:

etching the plurality of traces so that the surface of the traces and the surface of the molding material are not located in a same plane.

21. The manufacturing method according to claim **12**, wherein the step of forming the insulating layer comprises: forming a compound insulating layer comprising a plurality of insulating layers formed in several times of formation, wherein each insulating layer is formed by disposing the carrier with the mold to form the at least one mold cavity and infusing the mold cavity with a molding material.

22. The manufacturing method according to claim **21**, wherein all of the plurality of insulating layers comprise the same molding material.

23. The manufacturing method according to claim **21**, wherein the plurality of insulating layers comprise several molding materials.

24. The manufacturing method according to claim **12**, wherein the plurality of traces form a plurality of package trace layout units arranged in a matrix in the inside area of the insulating layer bounded by the enforcement ring.

25. The manufacturing method according to claim **24**, further comprising: disposing a plurality of semiconductor chips on the insulating layer, wherein each semiconductor chip corresponds and connects to one of the package trace layout units;

forming a chip insulating layer to encapsulate the plurality of semiconductor chips; and removing the enforcement ring.

26. The manufacturing method according to claim **12**, wherein the mold cavity determines the area of the insulating layer on the carrier.

27. The manufacturing method according to claim **12**, further comprising: forming at least one hole on the enforcement ring, wherein the hole corresponds with the outside area of the insulating layer.

28. The manufacturing method according to claim **1**, **3** or **12**, further comprising: disposing a plurality of conductive protrusions on the exposed plurality of traces.

29. The manufacturing method according to claim **1**, **3** or **12**, wherein the semiconductor element is a receiving substrate or a chip package.

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